Viewpoint
An Exploration of How Natural Resource Management (NRM) Discourse is Integrated into Key Pedagogic Texts

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Abstract

Natural resource management (NRM) education has the potential to improve the quality and relevance of rural education in South Africa. For this potential to be realised, the various educational resources that are commonly used by teachers and learners in rural schools need to incorporate natural resource management knowledge. Using Bernstein's concepts of classification and his theories on recontextualisation, a content analysis study was carried out to compare the level of NRM integration within the Grade 10 Life Sciences syllabus, and a Grade 10 Life Sciences textbook. Results from the analysis of the syllabus showed that overall only 9% of all the knowledge statements analysed had a strong link to NRM and related issues. The highest percentage of such sentences was found in the Core Knowledge section of the syllabus (21%). For the textbook, only 8% of the analysed items had a strong link to NRM and related issues, with the highest percentage of such items occurring in the Suggested Activities section (16%). However, the level of NRM integration in both documents increased considerably when sentences that had only an implicit link to NRM and related issues were included. It was concluded that both documents provide ample opportunities for NRM learning, although the extent to which this occurs varies among their different sections. The recontextualising role of the Grade 10 Life Sciences textbook was reflected in its relatively higher level of NRM integration in the Suggested Activities category, and in the Glossary category. This study highlights the need for further strengthening of the position of NRM within the Grade 10 Life Sciences syllabus, and for more Bernstein-based research to inform South Africa's curriculum reform initiatives in environmental education.

Introduction

The wide gap between schooling in rural and urban areas of South Africa continues to be a major challenge to post-apartheid education policy makers, despite the formulation and implementation of numerous policies intended to remove such inequalities. In the Eastern Cape, there are over two million rural learners (Nelson Mandela Foundation, 2005), the majority of whom continue to receive education in conditions of deprivation and extreme neglect (*ibid*.). One of the recommendations made by the Ministerial Committee appointed by the national Department of Education to investigate challenges facing rural schooling in South Africa is the need to pay more attention to curriculum design and implementation issues. According to this committee's report (DoE, 2005) schooling in rural areas of South Africa would be better served by curricula which also draw on local community's environmental assets, knowledge and

skills. Given the great importance of natural resources to the livelihood of communities residing in rural areas of South Africa (Lotz–Sisitka, Timmermans and Ward, 2005), such curriculum initiatives would focus on local natural resources. This has the potential of not only improving the quality and relevance of education for learners in rural areas of the country, but also of contributing to environmental sustainability in those areas (*ibid*.).

It is well documented that teaching and learning materials (TLMs), of which textbooks are a key component, are crucial for effective implementation of the curriculum. Unfortunately, the availability of high quality textbooks remains a major challenge to curriculum reform in South Africa (DoE, 2000). When schools are understaffed, teachers under-qualified, and lacking support (as is the case for a high proportion of rural schools in the Eastern Cape), textbooks are likely to be the key definers of what is taught and learnt. In such contexts, teachers are more likely to follow closely what is offered in the textbook, resulting in the textbook replacing the national curriculum. Hence, efforts to incorporate natural resource management (NRM) into the curriculum of rural schools need to take into account the position and status given to NRM within the various teaching and learning resources that are commonly available in rural schools.

This article reports on a study that was conducted to analyse the integration of NRM in two types of pedagogic resources commonly available in most rural schools in the Eastern Cape: the subject syllabus and the school textbook. The analysis focuses on South Africa's Life Sciences syllabus and Life Sciences textbook, both for Grade 10. The Life Sciences syllabus for Grade 10 is part of a new curriculum, the National Curriculum Statement (NCS) which is gradually being introduced into Grades 10–12, starting with Grade 10 in 2006. This curriculum has been available to schools and the general public since 2005. Schools in the Eastern Cape are free to order any textbooks from prescribed lists provided by the various textbook publishers. The Life Sciences textbook used in this study was the only one in use at two schools sampled during an earlier pilot study conducted in the Peddie district of the Eastern Cape. The study on which this paper is based is part of a larger PhD research project which is investigating the integration of NRM into the curriculum of rural schools in the Eastern Cape, as a strategy towards improving the quality and relevance of the education they offer.

This study is based on Bernstein's concept of classification, and his theories on recontextualisation (Bernstein, 1990; 1996). Bernstein uses classification to conceptualise power in pedagogic relationships. According to him, where different categories exist, for example subjects in a curriculum or institutions in the education system, power is reflected in the ability of a particular category to insulate itself from the rest. A category which is powerful is able to maintain strong borders around itself, which gives it a particular identity and a strong voice. Such a category is described as being strongly classified. On the other hand, a category which is weakly classified has porous borders which allow for cross-exchanges between the different categories, resulting in loss of identity and voice.

According to Bernstein (1990), there are three hierarchically related fields which constitute pedagogic discourse: production, recontextualising and reproduction. Official subject syllabi or national curricula are produced in a sub-section of the recontextualising field called the Official Recontextualising Field (ORF), and represent the official recontextualisation discourse. The

ORF is under the direct influence of the government and its agents. The analysis of ORF texts and practices would reveal (for example) intended government curriculum policy, in this case towards the integration of NRM into the curriculum. School textbooks, training manuals and teaching guidelines are examples of pedagogic texts produced in the second sub-section of the recontextualising field called the Pedagogic Recontextualising Field (PRF). The analysis of these texts would help to illuminate the interpretation of this official policy by the various agents located in the PRF.

As the texts move from one field of pedagogic discourse to another, they undergo modification as a result of selective appropriation of different discourses and their relocation, and the final product no longer resembles the original discourse (*ibid*.). It is worthwhile to compare the contents of the ORF and PRF texts for their underlying messages (for this study, messages which relate to the integration of NRM). This will help improve our understanding of the recontextualising process, and hopefully contribute to effective NRM integration policy design and implementation.

Methodology

Content analysis was used to assess the classification (integration) of NRM within the Grade 10 Life Sciences syllabus and Life Sciences textbook. The analysis was both interpretive and quantitative. First, the two documents were examined to form categories under which the analysis was to be carried out. This was necessary because the two documents are structured differently. For the syllabus, these categories were: Introduction (principles, subject definition and purpose); Objectives (aims, outcomes and assessment standards); Core Knowledge (content, learning areas, themes, topics and concepts); and the Glossary. For the analysis of the textbook, in addition to the Core Knowledge and Glossary categories, the other categories were: Illustrations (diagrams and photographs) and Suggested Activities (experiments and investigations).

For the analysis of texts within each category, the sentence formed the unit of analysis, and only those sentences which referred to knowledge were considered. For the analysis of the Illustrations category, all items under one caption were counted as one item. In the Glossary category, individual words formed the unit of analysis. For each item analysed (i.e. sentence, illustration or word) a classification value was allocated to reflect the embedded degree of NRM integration, using Bernstein's 4-point classification scale (C^{++}; C^{+}; C^{-}; C^{--}). Where there was specific and direct reference to NRM or its related issues, the degree of NRM integration was judged to be very strong and the highest classification value of C^{++} was allocated. Those items which referred only to Life Sciences knowledge were seen as lacking NRM integration and were allocated the lowest classification value of C^{--} (see Table 1 below). Lastly, for each document, the total number of items under each classification value was computed, and their frequency distribution across the whole document displayed in a graph.

Table 1. Criteria used to assess the classification of NRM within analysed items (word, sentences or illustrations)

Word/Sentence/Illustration Characterisation	Classification Value
Explicitly refers to NRM and related issues	C++
Implicitly refers to NRM and related issues	C+
Link to NRM/related issues is general	C-
No link at all to NRM or related issues	C--

Results

Figure 1 shows the results of the analysis of the Life Sciences syllabus for Grade 10, while a summary of the same results is provided in Table 2.

Figure 1. Classification of NRM within the Life Sciences syllabus for Grade 10
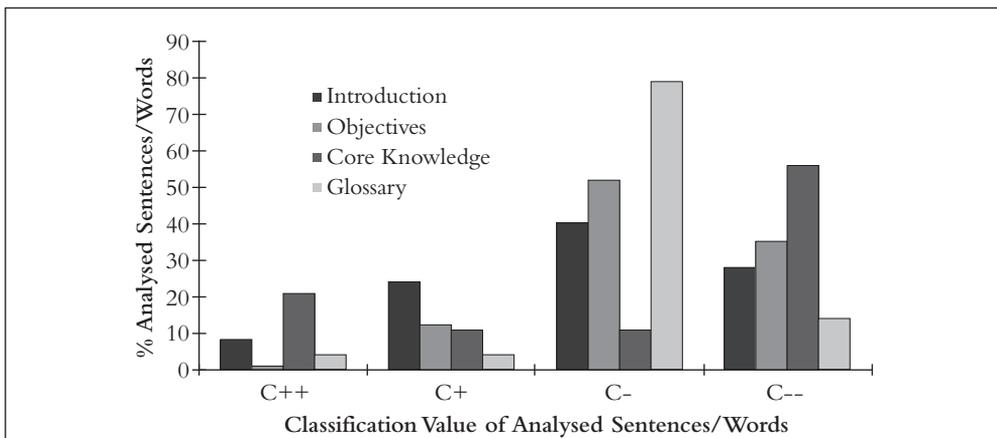
Table 2. Summary of the results from the analysis of classification of NRM within the Life Sciences syllabus for Grade 10 (n=216)

Classification Value of Sentence/ Words	Number of Sentences/ Words	% of Total Sentences/Words Analysed
C++	19	9
C+	26	12
C-	88	41
C--	83	38

The findings of the analysis reveal that the level of NRM classification varies across the different categories (sections) of the syllabus. NRM classification was strongest in the Core Knowledge category, where 21% of analysed sentences specifically referred to NRM and related issues.

However, this same category also had the highest proportion of knowledge sentences which had no link at all with NRM (56%). The classification of NRM was weakest in the Objectives and Glossary categories, where only 1% of the analysed sentences and 4% of the analysed words, respectively, had an explicit link with NRM and related issues. Overall, in only 9% of the total number of analysed items was the link to NRM and related issues explicit, while those which referred only to Life Sciences were over four times as many.

The results of the analysis of the Life Sciences textbook for Grade 10 are shown in Figure 2, and Table 3 gives a summary of those results.

Figure 2. Classification of NRM within the Life Sciences textbook for Grade 10
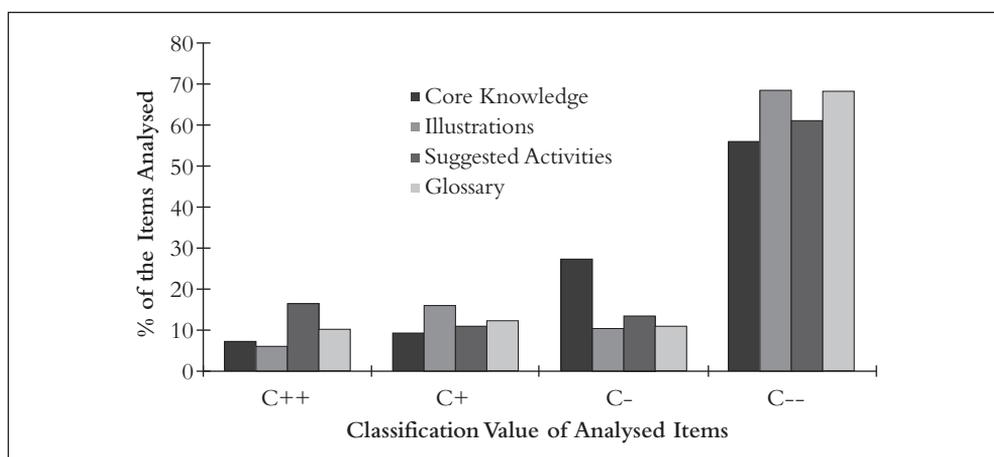
Table 3. Summary of the results from the analysis of classification of NRM within the Life Sciences textbook for Grade 10 (n=646)

Classification Value of Item	Number of Items	% of Total Items Analysed
C++	53	8
C+	89	14
C-	79	12
C--	425	66

Again, the various analysis categories of the textbook showed different levels of NRM classification. NRM classification was strongest in the Suggested Activities category, where 16% of the sentences analysed had an explicit link to NRM and related issues. The categories which showed the weakest classification for NRM were the Core Knowledge and Illustration categories, which had only 7% of the sentences and 6% of the illustrations, respectively, explicitly linked to NRM and related issues. Overall, in only 8% of the analysed items was NRM strongly classified, while the vast majority (66%) had no link at all to NRM and related issues.

Discussion

The Life Sciences syllabus for Grade 10

The principle of integration of subjects underpins curriculum reform in South Africa, and this is reflected in the Life Sciences syllabus for Grade 10. Although the analysis of the syllabus showed that overall integration of NRM was low, in some of the sections of the syllabus NRM had a distinct and unique position (for example in the Core Knowledge and Introduction categories). However, when sentences with an implicit link to NRM and related issues are also included, the integration of NRM within the whole syllabus becomes considerable. It can thus be concluded that the Life Sciences syllabus for Grade 10 provides ample opportunities for NRM learning, although the extent of these opportunities varies across its different sections. Examples of references in the Core Knowledge category that have a high level of NRM integration include:

- Management and maintenance of natural resources (DoE, 2003:36)
- Exploitation vs sustainability: exploring issues (*ibid.*:37)
- Biodiversity of plants and animals and their conservation (*ibid.*:39)
- Threats to biodiversity (*ibid.*:39)

The Life Sciences textbook for Grade 10

A similar trend regarding NRM integration was found in the Life Sciences textbook: while overall NRM integration was low, in certain sections of the textbook the position of NRM was very strong. This was especially so in the Suggested Activities category. Examples of suggested activities with a high level of NRM integration included:

- Identifying indigenous and alien plants growing in areas around the school
- Conducting a class debate on afforestation
- Conducting case studies on how to solve local environmental problems
- Finding information on local nature reserves or game parks

The syllabus and the textbook differed markedly in their contents and layout, making direct comparisons of NRM integration levels between the two difficult. However, some insight can be obtained by comparing the Glossary category since it was common to the two documents. In the syllabus, the Glossary category had among the lowest levels of NRM integration, while in the textbook the same category showed considerably more NRM integration. Bernstein (1990) speaks of powerful categories being able to develop and maintain specialist language. The relatively lower use of NRM-related specialist terms in the Life Sciences syllabus could be working against a stronger classification of NRM in that document. However, in the textbook the use of such terms increases substantially, which possibly contributes to the strengthening of the position of NRM in the textbook.

The above findings point to the important role played by the Life Sciences textbook for Grade 10 as a recontextualiser of NRM knowledge. Another example of the recontextualising role of the textbook is evident in the Suggested Activities category. While the number of suggested activities in the syllabus was too low to warrant further analysis, in the textbook this category showed the highest level of NRM integration. Thus this textbook provides its

users with further elaboration of the intended official educational policy on NRM integration within the Grade 10 Life Sciences. This is an important role in the rural education contexts, where teachers, learners, parents or other members of the community may find it difficult to access or interpret official educational policies, or where they are limited by various factors in designing NRM-related teaching and learning materials, or activities.

Conclusion

It has been argued above that rural schools in the Eastern Cape could pay more attention to NRM in their curriculum implementation activities, as a strategy towards improving educational quality, relevance and environmental sustainability. Despite concerted efforts to train teachers in the production of low-cost relevant teaching and learning materials, for the vast majority of teachers in rural schools, official subject syllabi and school textbooks will remain the major sources of educational knowledge for the foreseeable future. This highlights the need for more research into the contribution these pedagogic documents make to effective and successful curriculum reform initiatives in rural schools.

South Africa's post–apartheid educational reforms are underpinned by an integrated approach to curriculum content and implementation. This approach is especially strong in South Africa's environmental education circles. However, there is paucity of theory-informed research relating to subject integration at the various levels of the curriculum design and implementation process. Although generalised overviews of syllabi and other pedagogic texts are useful, what is even more important is theory-based research to inform, for example, the subject integration process. Bernstein's theories on curriculum structure and on pedagogic discourse provide a much needed theoretical foundation for such studies. For example, his concept of classification, and his theories on recontextualisation, can be used as a lens for analysis of intended government policy on subject integration, on the effect this has on the position and status of the integrated subject within the curriculum, and on the interpretation of the integration policy by various agents at various levels of the education system. Such studies have the potential to contribute to a deeper understanding of the macro and micro related curriculum processes associated with subject integration within a South African rural education context. Chisholm (2004) noted the paucity of research related to subject integration at the classroom level in South Africa. It is hoped that the broader PhD study that I am engaged in will contribute further to the erosion of that deficit. This paper represents a small-scale exploratory initiative in this broader project, and as such it opens some viewpoints worth pursuing in more depth.

Notes on the Contributor

Yvonne Nsubungu is a PhD student in environmental education at Rhodes University. She is a recipient of the Nelson Mandela Foundation Scholarship for research into rural schooling in South Africa. Her major interests are curriculum research in rural school contexts, with specific reference to natural resource management. Email: ynsbga@yahoo.com.

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